

Teaching an Online Graduate Multimedia Design Course Using Studio-Based Pedagogy

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Abstract

This design narrative describes the iterative process of redesigning a multimedia design and applications graduate course from a face-to-face to an online distance education format, attempting to replicate critical elements of studio-based pedagogy in a primarily asynchronous environment. The authors document their experiences from the initial planning phase of the course design process throughout the facilitation stages of teaching and learning during the duration of the sixteen-week course. Using a variety of data sources, including instructor observations, reflections, and journals, as well as student generated data such as products, communications among classmates and with the instructors, mid-semester (formative) and post-semester (summative) course evaluations, and student interviews, the authors describe this process and offer consideration for future designers within this narrative. As they documented and reflected on this experience, the instructors focused particular attention to the following elements: specific instructional technology resources that facilitated student understanding of course content and the instructional design process, logistical and technological barriers and steps taken to mitigate those barriers, and how to use their experiences to improve future iterations of the course.

Keywords: Design Narrative, Online Course Development, Studio-Based Pedagogy, Online Learning & Pedagogy, Multimedia Design

Introduction

This design narrative describes the decisions and processes of two instructors, one the-instructor-of-record, the other a graduate teaching assistant, in the development and facilitation of a graduate level, online multimedia design course ECI 514: Multimedia Design and Applications in Instruction. ECI 514 is offered by XX State University's Department of Teacher Education and Learning Sciences within the College of Education. The course is described in the university catalog as an "Examination of learning theories and research-based principles for multimedia design to select/apply appropriate digital resources and create maximally effective educational products." The goal is for students to come to understand how learning theories, multimedia methodologies, instructional design, visual communication, and user experience principles can be integrated to create effective multimedia learning products. The course is taught entirely online in a primarily asynchronous format. Although this course had been taught online by other instructors at the university, the Fall 2015 version was the first instance that the authors taught the course in an online environment. The second author, as instructor-of-record, taught previous iterations of the courses at another university in a face-to-face

format where pertinent elements of studio-based pedagogy to support teaching and learning goals were adopted. The instructor-of-record intended to integrate some of these same critical elements of studio-based pedagogy into the delivery of ECI 514 as well. (See Studio-Based Pedagogy section for a full description of these elements.) Therefore, the instructors' primary goal was to create an online course that utilized studio-based pedagogy within the constraints of a primarily asynchronous environment.

This article will discuss the pertinent decisions made by the instructors to deliver an optimal online learning environment for students using studio-based pedagogy, as well as identify obstacles encountered throughout the process, decisions made to overcome these obstacles, and specific technologies and pedagogical strategies that served to facilitate the students' learning experiences of multimedia design. Since the instructors were also the instructional designers of this course, the article will refer to them as both instructors and designers within the narrative.

Method

Design Context and Initial Design Decisions

For the Fall 2015 term, sixteen distance education students, a majority of whom were candidates in the university's Digital Learning and Teaching (DLT) Master's degree program, were enrolled in the three credit-hour graduate course. The course was delivered through the university's learning management system (LMS), Moodle™, which allows students ubiquitous access to course content throughout the semester. Moodle™ is pre-equipped with a variety of instructional technology tools such as discussion forums, wikis, online chat tools, and quiz functions that can be integrated into the interface of each class Moodle™ instance to facilitate the online learning experience. The instructors decided that the intended main flow of course activity would consist of assigning students course readings each week with associated activities designed to scaffold student understanding of the course materials such as discussion forum posts and reflective blog posts. In addition, they assigned four iterative phases of a major deliverable throughout the semester that would enable students to apply their knowledge of learning theories, instructional goals, and instructional design to create a low fidelity yet functional multimedia learning product.

Each instructor within the DLT concentration has the autonomy to design courses in a manner that coincides with their teaching philosophy as well as areas of expertise. Thus, for the iteration of the course reported, the instructors were able to focus on goals and objectives that were most essential to teaching multimedia design from a studio-based learning perspective. As a result, the course sought to address the following course objectives:

1. The student will describe the concept of design that relates to cognate fields, including human-computer interaction, industrial design, and computer engineering.
2. The student will assess realistically respective skill levels in design and technology by means of applied media production projects.
3. The student will develop the skills of development and production processes that will contribute to future professional efforts.
4. The student will acquire basic media design and production skills, or improve existing skills to be comfortable working within a team that includes design and production specialists.
5. The student will attune to trends in media delivery and use that may alter the design process.

6. The student will reflect on and explain the design processes used in creating engaging, motivating interactive media that teach either domain-specific content or higher-order thinking skills.
7. The student will design, develop, and document an interactive media for learning storyboard, identifying target users, objectives, outcomes, and means of evaluation.

Studio-Based Pedagogy

The instructors sought to use studio-based pedagogy to teach students the incremental and iterative design process that is also characteristic of research-based best practices of multimedia design. Although studio-based pedagogy has its roots in the field of architectural education, increasingly studio-based pedagogy has been adapted by cognate fields such as human-computer interaction, industrial design, computer engineering, and software design (Arvola & Artman, 2008; Cennamo et al., 2011; Hundhausen et al., 2008; Kuhn, 1998; Lackney, 1999). For the purposes of this study we define studio-based pedagogy with the following characteristics: 1) students are introduced to an ill-defined design problem by the instructors, 2) students work incrementally and iteratively throughout the semester to propose a solution to the design problem, 3) students rely on peer, instructor, and expert critique to improve their design processes and subsequent iterations of their solution, 4) the solution progresses from initial rudimentary outlines to more detailed and refined models, 5) knowledge is refined through reflection, and 6) students are expected to defend and justify their design decisions (Schon, 1983, 1987). Throughout this process are critical elements that support the design process such as the use of design precedents to inspire design, formal and informal review and critique of designs through pin-ups and desk crits, the reliance on peers as a critical resource, the use of varying levels of fidelity of media at different stages in the design process, and the use of constraints to inform design (Arvola & Artman, 2008; Cennamo et al., 2011; Dannels, 2005; Hundhausen et al., 2008; Kuhn, 1998; Lackney, 1999).

As noted in the course objectives, one goal was to facilitate student understanding of the design process in fields such as human-computer interaction, industrial design, and software engineering in an attempt to apply to multimedia design practices in relation to the major assignments of this course. Since studio-based design practices are integral approaches within these fields, the instructors intended to implement several of these practices to teach this version of the course. Based on the primary instructor's past experiences, he particularly valued the ability of studio-based pedagogy to spur creativity, emphasize the iterative process of design, promote incremental refinement of prototypes, and the value placed on peer critique.

Considering that studio-based design practice typically occurs in a physical setting where students work alongside their instructor and peers, the primary challenge for the instructors became the initial design of the course and how to recreate these essential elements of studio-based pedagogy within an online environment (Cennamo et al., 2011; Lackney, 1999). Therefore, the instructors sought to find strategies, outcomes, tools and resources that could be leveraged to support the students' understanding and development of the design process within the constraints of an online, primarily asynchronous learning environment.

Course Structure and Course Syllabus

An initial decision that confronted the designers was how to structure the course content to best support the needs of online learners in a manner that would be consistent with studio-based teaching

and learning, as well as how to support online learners in general. The initial phase of course design began in early July of 2015 and continued throughout the remainder of the summer as the instructors worked to plan the course structure, content, as well as explore possible tools for integration to support studio-based learning in an online environment. The drafting of the course syllabus became a starting point as they began to plan and design the course. They decided to adopt a previous version of a syllabus that had been used in a multimedia design course taught by the instructor-of-record at another university in a face-to-face format as an inspiration and to serve as a template as they began to formulate a course experience that met the needs of students. The designers wanted this document to serve as a foundational framework that would outline the structure and the expectations of the course for the students. After working on a Google docs version for several weeks during the summer, the final document consisted of thirteen pages and contained the course description, goals and objectives, rubrics for all assignments including blog posts, discussion posts, and each of the four phases of the major deliverable, as well as a timeline with all required course readings and assignments listed for each weekly unit.

The course was divided into seven units which were further subdivided into weekly topics. In an attempt to provide consistency and keep all students at the same pace with postings and course materials, it was decided that each topic would have a planned release day of Wednesday of each week with the first assignment due on Fridays.

The decision was made that there would be a culminating student project due at the end of the semester that would enable students to demonstrate their mastery of the course goals and objectives. This project was the design and evaluation of low-fidelity functional prototype of an educational interactive media product that catered to the needs of a specific group of learners at the student's discretion. In accordance with studio-based design principles, the project was framed as an open-ended problem that could result in a variety of design solutions (Arvola & Artman, 2008; Kuhn, 1998; Matthews, 2010; Shaffer, 2003). The project was initially presented to the students with a brief overview description of the project on the course syllabus with a corresponding rubric. Keeping in line with studio-based pedagogical principles and the emphasis on incremental and iterative refinements, the final deliverable was divided into four distinct phases due at different points during the semester in which each phase would be assessed using the same grading rubric. Students were introduced to the four iteration design phases of the project during four of the weekly unit topics throughout the semester. Design precedents for each phase were provided for scaffolding in the form of exemplars from previous iterations of the course in electronic form on the LMS. Templates were also posted on the LMS in the form of a Microsoft Word document that could be downloaded and customized by each student.

Replicating the Studio Design Process with Online Tools

As mentioned, the substantive challenge for the instructors was the recreation of the studio-based experience for students given the constraints of an asynchronous online learning environment. Therefore, they sought to leverage technological tools available within the Moodle™ environment, as well as free online tools that would be easily accessible to students to scaffold their learning and design experiences in accordance with some of the following studio-based principles.

Frequent Communication with Master Designer

Brocato (2009) describes regular access to experts in the field of study as an integral element of the physical space of studio-based architectural education (p. 140). Furthermore, Cennamo et al. (2011) found the norms of a studio-based environment consist of a “constructive framework” which “positions teachers and students in social interactions in which the design process is a shared experience” (p. 25). In such an environment, students would have frequent interactions with their instructor who would serve as a master designer making frequent suggestions for revisions of their design product (Lackney, 1999). Given this characteristic of studio-based pedagogy and lack of physical meetings an asynchronous distance learning environment poses, it became imperative to create open lines of communication between the instructors and students that could serve as conduits for the types of shared interactions central to a studio-based learning environment. One strategy implemented early was a Question and Answer discussion forum within the LMS where students could post questions for the instructors, as well as classmates to see and respond to. The intention was for the forum to act as a community message board where students could benefit from broadly relevant questions. It was also anticipated that email would be a primary means of communication between instructors and students; therefore, the instructors planned to make use of the group e-mail function of the course Moodle™ and frequently check their e-mail accounts for student questions and concerns.

Guest Experts via Video Conferencing Tools

Another key element of the studio design process is the use of guest experts with specialized professional knowledge (Brocato, 2009; Cennamo et al., 2011). To address this characteristic, the designers invited a guest speaker who was a user experience expert at a local commercial video game company to provide three synchronous guest lectures. In addition, the guest speaker utilized her expertise to direct the instructors to resources that would support students’ understanding of the concepts to be covered in the guest presentations: user experience and educational games, and cognitive psychology and video games. As a result an initial decision had to be made as to the best delivery method to enable the guest expert synchronous delivery of her presentation to the students, as well as facilitate interaction between her and the students as to maximize their exposure to her expertise for the benefit of their own multimedia design efforts. The topics of the two scheduled lectures were cognitive psychology and video games, and user experience and game design. Each lecture was planned to last approximately an hour.

The best forum for the guest lecture to occur synchronously online was considered and debated. The LMS does enable an add-on feature known as Blackboard Collaborate™ which allows for synchronous lectures and presentations; however, due to the fact that the guest lecturer was outside of the university and would not be familiar with this tool, Google Hangouts™ was chosen as the delivery medium. Being sensitive to the needs of distance education students, synchronous participation in the Google Hangouts™ was not made mandatory, although students were expected to watch an archived version of the presentation.

Using Linoit to Support Pin-up Sessions

Schon (1992) underscores the design process as “communicative activity in which individuals are called upon to decipher one another’s design worlds,” (p. 4). Pin-up sessions are one avenue to facilitate this communicative process and thus are viewed as integral components of the critique phase of “the propose-critique-iterate process” of the studio-based learning characteristic of architectural design

training studios, in which both instructors and students can easily view designs to provide feedback (Brocato, 2009, p. 139). Dannels (2005) described the pin up as “the oral genre where students displayed work on a large wall or board and received feedback on it” (p. 144). Therefore, there was a need to find a platform that would allow for replication of this transparency component of the pin-up session in an online environment. After some searching and evaluation of current digital tools, the instructors decided to leverage the capabilities of the digital tool Linoit. Linoit is an electronic canvas board that enables users to post text-based sticky notes, images, videos, and attach files. The expectation was that students would highlight portions of their designs and design choices that they were confident and not confident to facilitate this formal critique process that is integral to the iteration components of students’ design solutions.

Creating a Climate of Peer Support

A healthy climate of constructive peer support is a well-documented requirement of studio-based pedagogy and successful online learning experiences in general. In the context of studio-based learning experiences Cennamo et al. (2011) maintain that peers are valuable resources and therefore, collaboration with classmates is regarded as “essential to the success of both PBL and SBL experiences” (p. 14). As a result, this became an ambitious objective of the instructors within the initial design of the course structure and an important consideration of which tools would best support a climate of peer support. Since this milieu of constructive peer support would become intensively more critical as students began to develop their multimedia design products and began to rely on one another for critique, the goal became to scaffold and build this community atmosphere early on in the semester where students would develop dialogs and form relationships with one another through the use of discussion forums and blog posts. It was decided to utilize an online discussion forum tool within the Moodle™ suite and blogging tool, Blogger, in which students posted the url to their ongoing blog reflections in a class wiki page on the LMS. Blogger is a well-known web 2.0 tool that enables students to comment on each other’s posts. To encourage and scaffold the peer-to-peer communication, within the rubrics for these assignments we incorporated criterion that included mandatory number of replies, as well as substantive replies that thoughtfully extended the discussions. Also, every weekly assignment in the course required some form of peer feedback whether the assignment was a discussion post or major deliverable such as a Pin-up.

Data to Inform the Design Process and Reflect on Challenges

The instructors proposed to use a variety of data sources to improve the course throughout the semester as well as to refine future implementations of the course. These intentions of efforts were consistent with the primary instructor’s beliefs on the importance of the iterative design process, as well as the Association for Educational Communications & Technology’s (AECT) definition of educational technology which emphasizes the facilitation of learning and improving performance (Dondlinger, 2015, p. 55). Some of these data sources included reflexive journals, student products and performance, correspondence with the students, the results of formative and summative evaluations, and student interviews.

Journal

One of the main sources of data collection existed in the form of a reflexive journal kept by the teaching assistant. She began journaling prior to the start of the semester during the initial planning and development stages of the course, and continued to capture her thoughts, observations, and reflections throughout the semester. Journal entries were recorded in a Google Doc throughout the semester

depending on course-related developments she deemed noteworthy. Many entries were written after designated weekly course planning meetings between the primary instructor and teaching assistant as the planning meetings themselves became a rich source of reflection where the instructors could discuss any anticipations of upcoming challenges or reflect upon existing challenges that had recently arisen. The sources of data recorded in the teaching assistant's journal were also inspired by events such as e-mail correspondences with students throughout the semester, the reflections and sentiments expressed by students in the discussion forum and blog posts as part of their weekly assignments, student submitted to the course Question and Answer Discussion Forum, assessment of and reflection on student work products, and her observations of synchronous meeting experiences via video chats.

Formative and Summative Course Evaluations

Formative and summative online course evaluations were also used to collect student feedback about their experiences in the course. A mid-semester course evaluation was delivered to the students electronically through a course email and was also accessible through the course LMS for a one-week period. Out of the sixteen students that were enrolled in the course at the time, nine students completed the anonymous surveys and the results from these surveys were used to inform the designers' decisions to modify certain elements of the course mid-semester. The university also administers a standard online course evaluation survey to all distance education students towards the end of each academic semester. The results from this summative survey were made available to the instructors after grades were submitted and therefore were used as a data source to inform decisions about future iterations of the course.

Student Interviews

The teaching assistant conducted one-on-one interviews with three of the students after the semester had ended. The interviews took place during a Google Hangout and lasted from twenty to forty-five minutes. The teaching assistant followed a semi-structured interview protocol and audio-recorded each interview. The purpose of the interviews was to elicit the students' perceptions of facilitators and challenges experienced within the course in an attempt to modify and improve upon the course structure and delivery in future semesters, as well as corroborate some of the designers' perceptions of the students' learning experiences in the course.

Results

Challenges Encountered and Actions Taken to Overcome those Barriers

As the course ensued several pedagogical, structural, and technical challenges in meeting the overarching goal of facilitating student learning in an online asynchronous multimedia design course utilizing studio-based pedagogy were encountered. Using the teaching assistant's reflexive journal as the primary data source, the following were identified as the primary obstacles to achieving the designers' instructional goals.

Course Design and Delivery Issues

Time Constraints. One of the most frequent and salient criticisms from students during the first half of the semester was that they were not given enough time to read and reflect on the complex nature of the course materials. These sentiments were iterated in e-mails to the instructors, as well as feedback generated through the mid-semester evaluation with students requesting "more time to ponder/digest [the] material." Considering these students are mostly working professionals, a few students expressed that it was difficult to get all material read, reflected on, and responded to within three days. Originally

the course units and topics were structured to be available to students on the course management system on Wednesday of each with original assignments due Friday and responses to peers due by Monday of each week. The original intention was to give students enough time to thoughtfully read and respond to their classmates' work and to avoid the tendency of students to post at the last minute and all at one time. In response to student requests and feedback, the instructors adjusted the timing to release materials on the Friday before the official duration of each course unit and topic. These changes were made clear to students in an email to the entire class that their feedback was valued and responded to as efficiently as possible without comprising the fidelity of the read, post, and respond process that was critical to scaffold the peer support and critique they would need to complete the course project.

Multiple Technology Tools and Mediums within One Course Shell

One design critique offered during student interviews was that having multiple technology mediums was a source of confusion for students. The students had been required to set up an account with Blogger and Linoit for use with class assignments throughout the semester. One student noted that he often forgot his username and password for both tools and would have to retrieve that information before he was able to begin those assignments which made him lose work time. He also commented that it was also time consuming to have to leave the course Moodle™ to access an outside resource and he would have preferred to have used a tool available within the Moodle™ suite. Similarly, another student also suggested that the instructors use “one platform for simplicity” and “merge” the blog assignments with the discussion board posts. Nevertheless, it was the instructors' intention to allow students to have their own individual blog that would document their growth and understanding throughout the semester and a discussion board forum does not offer this capability. At the time of the course design phase there were not comparable tools available within Moodle™ that offered the same level of functionality that these tools did; however, alternatives will be explored in future deliveries of the course to accommodate these students' concerns.

Technical Issues

Surprisingly there were very few technical issues encountered in the course. Probably due to the fact that online delivery of courses has been happening for over a decade and the university has a strong instructional technology support system. Also, students were in DLT Master's program so most were already proficient with technology use.

Access Issues to Pre-recorded Instructional Videos

One of the most frequent technical issues encountered by both the students and instructors involved access to the instructional videos that had been pre-recorded and stored on the University's media platform My Mediasite. My Mediasite is a desktop recording tool that enables instructors to record video and then uses a web-based host to edit, store, manage, and share these videos with students. One student posted to the class Q&A Discussion Forum that she was having trouble viewing the recorded video on her Chromebook:

The video from last week took me over an hour to get through, with all the starting and stopping. I'm having the same issue again tonight with the lecture. Even opened it and let it sit for about 45 min to make sure it had buffered, but when I went to play it....darn thing reloaded on me and I was back at square one. Just trying to figure out if it's my machine or is it the Moodle?

After consulting with the University's help desk support for My Mediasite, the instructors advised the student through a reply to the Q & A Discussion Forum to contact the Office of Information Technology for individual support on how to clear temporary Internet files on her device in an attempt to facilitate the video download process.

The instructors also experienced difficulties recording and uploading video occasionally throughout the course. For the guest lecture videos which were longer than 60 minutes the uploading process took several hours to complete and on one occasion was unsuccessful and the video had to be uploaded a second time. Importantly, My Mediasite at the time of this narrative, was recently adopted by the University and some of these technical difficulties might be resolved for future courses as the technology department becomes more familiar with this tool. It is an important consideration for instructional designers to consider the type of technical support that will be offered to students and instructors for any particular video recording platform under consideration as was evidenced by the experiences within the delivery of this course where the help desk was contacted on several occasions for additional technical support with the video utility.

Pedagogical Issues

Many of the problems encountered throughout the duration of the course centered on pedagogical issues that are addressed below.

Misunderstandings with Assignment Requirements

An initial pedagogical challenge occurred during the first graded assignment in which students were required to respond to a discussion board prompt to synthesize their reflections on the assigned course readings. Students were provided a rubric for the discussion board assignments on the course syllabus which required them to reference the readings within their response posts, however, the majority of students failed to meet this requirement within their post. The instructors saw a need to address this problem early on since successful development of a multimedia product would require students to continually reflect on the resources provided throughout the course for their weekly assignments. As a result, the instructors provided prompt feedback to students noting the deficiencies as they related to the rubric through the course gradebook in Moodle™. The instructors also sent an e-mail to all students emphasizing the importance of referencing the course materials in their discussion posts and referring them to the page of the syllabus that contained the assignment rubric. In all future discussion forum assignment prompts, students were reminded to refer back to this rubric as they crafted their responses. It was also decided by instructors that there was a need to create lecture videos to accompany the introduction of each weekly assignment that would serve to emphasize some of the main points from the weekly materials that would require the students' attention, as well as clarify expectations for the weekly assignments. For the most part these actions served to circumvent future issues with deficiencies in students' discussion forum posts, as in subsequent discussion post assignments the students did a much more effective job meeting the rubric expectations.

Lack of clarity to students on assignments also became evident through the first Pin-up design as many of the students' deliverables did not meet the assignment expectations. See the appendix for the assignment template. Of the most common shortcomings was the lack of a commitment to a methodology for their multimedia product, unclear instructional objectives, or a lack of specificity on the description of their product. To remedy the situation quickly, the instructors immediately e-mailed

any student who scored developing or below on their Pin up rubric and offered each of these students the opportunity to have a one-on-one consultation via a synchronous Google Hangout to give them additional support. Students were also provided specific comments within their design document through the commenting feature of Google Docs™. For the future, the instructors are also considering having students go through a peer feedback session prior to submitting the assignment. In an attempt to address any future misunderstandings with upcoming phases of the project, the instructors recorded and made a video available to students that walked them through the templates and assignment expectations. It is also expected that providing the students with a greater number of project exemplars at each phase of the design process will assist students in having a clearer idea of the expectations for each project assignment. A common misconception that several students conveyed throughout the course and during the student interviews was that many students believed that their final multimedia design product had to be a high-fidelity working prototype of the product. As noted by one student in her interview this belief limited their design options due to their perceived limited technical abilities and available resources, “one thing I didn’t understand until the end is that we weren’t actually going to have to make it, so therefore, everything I was doing was in the context that I was going to have to make this.” The instructors will be sure to make this expectation clear to the students in the future in the course syllabus, assignment instructions, and course video lectures.

(4) Discussion Forums	Students will participate in six discussion boards worth 2 points each: introductions and five individual topics. For each discussion forum, students are expected to contribute at least one original post and several follow-up comments on peer posts.		
Discussion Post Forum Rubric			
Yes	No	Criteria	
		Post makes clear and specific references to and synthesizes the course materials from the unit topic. Post was made by the due date.	
		Replied to at least two classmates' posts that supported and/or extended the discussion with new ideas. Replies were posted by the due date.	

Figure 1 Discussion forum rubric

Brainstorming/Ideation

Many students had difficulties coming up with an idea for their multimedia project. The instructors received several e-mails from concerned students who were either “stuck” or needed additional feedback or validation for their ideas. To address this problem in the short term, the instructors offered for students to schedule one-on-one Google Hangout sessions for additional support and also invited students to e-mail the instructors with their ideas. The instructors noted in their journal several potential solutions to prevent this problem from occurring during future iterations of the course. First of all, they would push back the due date of the first Pin-up which was due within the first few weeks of the semester and students had not had time to learn about all of the methodologies that were to be covered in the course. Secondly, they would schedule some synchronous brainstorming sessions for students to discuss their ideas beforehand with the instructors and peers. They might also explore the possibilities of utilizing some additional Web 2.0 tools where students could post two or three ideas for the instructors and their classmates to provide feedback. The instructors will also include more examples of design precedents that have variation in terms of content areas, audience, and methodologies. Some students had asked for a list of ideas to choose from for the project, but the

instructors decided against this type of scaffold for fear that it would stifle students' creativity and ability to choose a product that was conducive to their own professional contexts. As a form of compromise, a list of resources that reflected existing multimedia examples on the web were given to the students to serve as an inspiration, but may have lacked relevancy to the students due to their complexity and high level of technical operation (e.g. BrainPop, Starfall, etc.). The instructors did not have many practical examples to share with students from previous deliveries of the course. In the future, some of the products produced by students in this iteration of the course will serve as future exemplars.

Enablers to Incorporating Studio-based Pedagogy Online

There were several instructional technology tools that aligned well with the pedagogical emphasis of the studio-based learning approach and served to enable the students to not only be successful with the creation of their multimedia project but also their ability to communicate the designs of those projects to the instructors and peers and their own understanding of the design process as it related to those projects.

Technology Tools to Support Communication of Design Intentions

Linoit as a Pin-up Tool. Linoit proved to be a successful tool that allowed students to communicate their design intentions to their peers in text, image, and video format. Figure 2 provides a screenshot of a student's pin-up using Linoit. It was noted in the instructors' journals that those students who took advantage of this technology medium to display screenshots, storyboards, and videos to convey their design details and design process were much more successful in achieving this goal.

As an unintended consequence of using Linoit, some of the students found the tool helpful for brainstorming and planning the design of their products as well. This purpose will be explored by the instructors for future use.

...it's like a mental dumping ground where you can throw everything out there you are trying to think about and organize it because of how easily you can move it. A nice canvas for fleshing out your thoughts, organizing things you came across you might want to use later, I found it helpful.

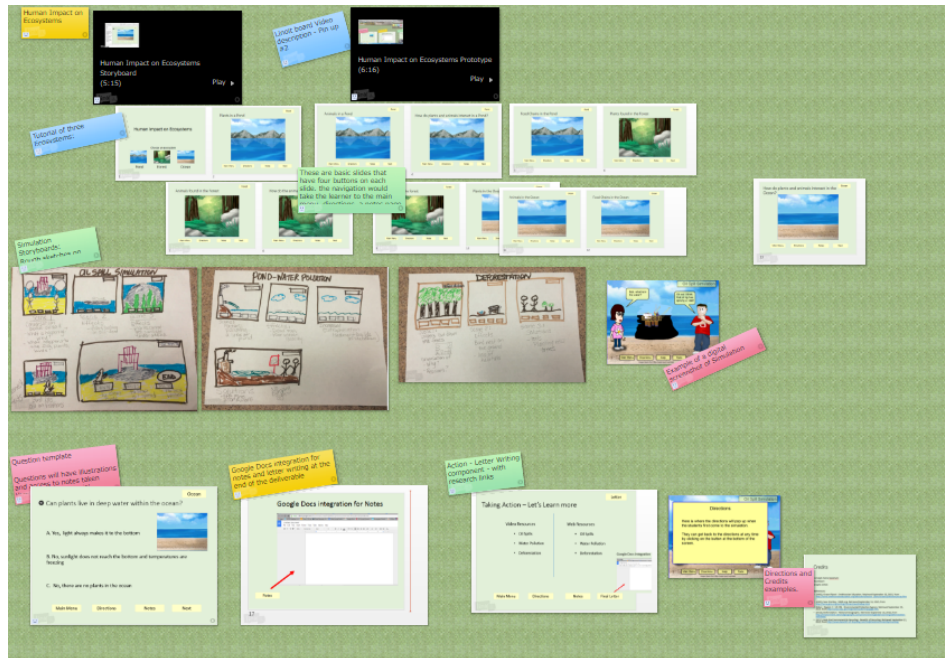


Figure 2 Linoit as a pin-up tool

Screencast Videos

An additional requirement for students was the inclusion of a video screencast of the students' design phase at their current point in the design process to be embedded within the Linoit. The purpose of the video was for the students to walk the viewer through their design and highlight key elements of it, as well as provide an overview of their product in its current phase of development. In the opinions of the instructors these screencast videos that the students created were invaluable in enabling them to articulate their design intentions and decisions with appropriate justifications. The final deliverable also required students to create and submit a 5 minute technical video demonstration of each student's multimedia product which helped the instructors when providing feedback and final grades.

Even though all students were expected to compose a Linoit canvas as part of the Pin-up #2 and #3 assignments with an accompanying screencast video guiding the audience through their design decisions, some students failed to meet this requirement in its entirety. One student in particular who struggled with his design throughout the semester expressed frustration in an e-mail to the instructor-of-record that he was unable to clearly convey his design intentions and requested a face-to-face office meeting:

I would like to meet with you in person regarding my pin up 2. I feel that I may not be communicating what I think I am communicating in my Pin up 2 and I have some questions that would be best answered in person.

It should be noted that this student failed to create a video walk through of his Pin-up and the screenshots he provided were very simplistic with little additional text and only providing a small sample of his product. This student had also neglected to take advantage of all individual and group synchronous video meetings that had been offered for additional support.

Measuring Student Understanding of the Design Process

Reflective blog posts proved to be an effective pedagogical tool for not only providing students a venue to document their design process but also as a means to assess their understanding. Students were required to write a blog post at the end of each unit intended to serve as a reflective tool to synthesize and apply the following learning experiences to their own understanding of the design process, as well as how those experiences related to the development of their own multimedia product: the assigned course readings, their experiences completing the unit assignments, their interactions and feedback received from the instructors and peers, and the ongoing development of their design product. For all blog reflections students were asked to use the following prompts to “inspire” them as they as they formulated their blog posts and responded to others’ posts: 1. Why are constructs from learning theories or principles from design and development critical to the design of successful multimedia for learning products? 2. How do learning theories, instructional goals, and design intent relate to one another? 3. How does your experience as an end user or developer of multimedia learning contribute to your understanding and application in the course? What challenges do you still face? 4. What insights do you gain about design develop as you move through the course readings and assignments?

Student interviews confirmed the instructors’ perceptions that the use of a blog was a valuable tool in aiding reflective practice. Although one student remarked that the blog entries were challenging because she is not innately “good at divergent thinking” another student commented that “even though we were reading the same material it was interesting to see how everyone applied it differently to what they were doing or how they were utilizing that information and knowledge in the growth of their own project.”

Below is an excerpt from a student’s reflective blog post:

This quote, while large, reflects many of the feelings that I have had over the past few weeks as I worked on my second pin-up. I began looking at making my interfaces more concrete by using a Weebly site. This allowed me to take my conceptual ideas and turn them into something solid and while not interactive, at least visible to others than myself. I also feel like I did a lot of reflective observation as I went through the process. I would create a page, take some screenshots and then walk away. I emailed some to my husband and got his feedback as a semi-outside viewer. I reflected on what he said, changed some things with my interface design and walked away again. Later on, after getting totally overwhelmed and stressed out, I tried to make the interfaces more simple. Walked away from those images for a day or so, talked to some co-workers and showed them images and finally decided that I couldn’t please everyone so I took all my favorite suggestions and came up with the interface screenshots that ended up in my pin-up. While jumping around like this is not how I prefer to work on things, the experience did provide me with some valuable insight into how others see my product and I was pleased with the results.

Frequent Communication with Instructors

A common theme iterated by students in interviews and surveys is that they appreciated the responsiveness of the instructors to their inquiries and the prompt and informative feedback they were given on their course assignments. In an attempt to reproduce the benefits of the traditional design studio where students are in frequent communication with their instructors and utilize their instructors as an additional resource, the instructional designers intended to maintain a strong online presence

throughout the course and tried to convey a sense of approachability. One of the ways this was accomplished was through regular e-mails during the week reminding students of upcoming assignments and offering to provide preliminary feedback on each student's design phase before the due date. Although not required, many of the students took advantage of the instructors' willingness to engage in "virtual desk crits" where the student and instructor would meet synchronously through a video conference to discuss a student's design. The students were also appreciative of the effort to respond to their work "quickly" and as one student commented, it "kept the momentum going" with her design process. Another student offered similar sentiments about the instructors' availability, "I always appreciated being able to write to you and get feedback, it felt like a good resource." Even though a strong online presence has been documented as a necessity in online courses, it seems that this is a critical quality for instructors who wish to use a studio-based pedagogy in an online course where students are particularly reliant on the instructor's expertise to complete their designs. It also helped to have an open forum on the course website where students could post questions for either their peers or the instructors to respond. This proved to be an important venue for students to ask questions about the course and assignments in a manner that made the responses transparent to everyone. The instructors were careful to check this forum on a daily basis as well as their e-mail accounts multiple times a day so student inquiries could be responded to promptly.

Scaffolding the Peer and Instructor Critique Process

One of the original course objectives was to create a climate of peer support that would serve to scaffold the peer critique process that would be needed for the design phases of the course. Considering this objective, the instructors felt that overall this goal was achieved during this iteration of the course and conclude that only a few additional modifications would be necessary in the future.

One of the components that helped to achieve this goal within the online context was the use of Google tools for student products as part of their design phase deliverables. Integrating and using Google tools was relatively easy considering the university uses Google, which allows students access to Google tools and an unlimited amount of storage in Google drive. In the first phase of the multimedia product, students use Google Docs™ to submit the text portion of their product. The instructors quickly found that those students who did submit their assignments as a link to a Google doc received quality feedback from their peers and the instructors. The commenting and suggesting features within the Google products enabled more pointed and granular comments in their design documents, which increased the clarity of the feedback. Students were also able to reply to the comments left by their instructors and peers if further clarification was needed. In contrast, students who had submitted their documents in a Microsoft Word file or pdf file received comments and critique collectively in a reply to their original post. The instructors noticed that this feedback was much more general and superficial in nature. As a result, all subsequent design phases of the multimedia product were required to be submitted as a link to a Google Doc for text-heavy assignments and Google Slides™ for iterations of the storyboard phase.

Another successful strategy for enabling students to provide constructive feedback to their peers was the initial use of the discussion board forums and the students' blog posts as a medium to initiate the peer feedback process. The first four weeks before the first iteration of the design document was due, students had been required to not only post to either a discussion forum or blog, but also reply to at least two of the peers with a post that "supported or extended their discussions." This served as a process that allowed students to acclimate to the peer feedback process and getting to know their peers

better before more constructive feedback was necessary. It also gave the students an opportunity to see the type of feedback given by the instructors that could serve as a model for the feedback they would provide to their classmates.

One issue that did arise with the peer feedback system that was in place was that all of the students did not receive an equal amount of feedback. Some students noted that they did not receive any feedback on some assignments, whereas others had received multiple replies despite the fact that the students had been encouraged to respond to a student who did not already have two responses. In an attempt to remedy this for future course deliveries, the instructional designers will consider assigning the same groups of students to critique each other's four phases of the design product throughout the course. Not only will this address the problem of students not receiving equal amounts of feedback, but as one student suggested in an interview it would enable the students to become more familiar with one product and its development throughout the course which will hopefully result in a more in-depth critique.

Conclusion

The purpose of this design narrative was to describe the design processes involved in attempting to replicate studio-based pedagogies to teach multimedia design in an online environment with others who may be interested in achieving a similar goal within a similar context. The instructors wanted to share the initial decisions and considerations to design the course structure and content that would maximize the students' online learning experiences in the course. In addition, they wanted to share the instructional technologies they integrated within the course that enabled them to utilize a studio-based approach to teaching the design process that led to the creation of a multimedia learning product. Based on the instructors' reflections and additional data sources, it can be concluded that several of the instructional strategies and technology tools integrated within the course aligned well with supporting student understanding of the design and creation of a multimedia design product for learning in an online, asynchronous environment. Table 1 lists and describes several of the instructional technologies and the integration strategies that aided the instructors in meeting the students' needs to achieve the goals and objectives of the course with a studio-based approach to teaching and learning. Throughout the duration of the course the instructional designers encountered enablers and inhibitors to meeting their initial objectives of teaching an online multimedia design course using studio-based pedagogy. Given the increasing demand for traditional courses and programs to be offered online, the instructors hope that their attempt to articulate and make explicit their successes and failures will serve as an inspiration to other instructional designers of online courses that may wish to integrate a studio-based approach.

Table 1 Alignment of studio-based pedagogies and instructional technology integration

Studio-based Pedagogy	Recommended Instructional Technologies and Integration Strategies
Frequent communication with master designer	Frequent e-mails to the class; a question and answer discussion forum; prompt and responsive feedback
Guest experts	Synchronous video chats

Pin-ups	Linoit or similar online canvas board; Synchronous video chats with peers and/or instructors
Instructor and peer critique	Use of Google tools or similar format that allows for suggesting and commenting; use of discussion forums that encourage peer interaction throughout the course
Ideation	Linoit or similar online canvas board; synchronous video chats with peers and/or instructors as brainstorming sessions; invitations for students to e-mail the instructors their potential ideas
Justification and articulation of design decisions	Recorded videos of design documents as a screencast; reflective blogs

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